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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

PANTUCK, BRADFORD C

ART UNIT PAPER NUMBER

3731

DATE MAILED: 03/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/925,046

Applicant(s)

HOSSAINY ET AL. *ED*

Examiner

Bradford C Pantuck

Art Unit

3731

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on January 31, 2005.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14, 57, 58, 60 and 62 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 62 is/are allowed.
- 6) ☒ Claim(s) 1-14, 57, 58 and 60 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-14, 57, 58, and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,190,404 to Palmaz et al. The inner surface (301) of Palmaz's stent has asperities formed from indentations (400, 400', 400", and 400''') [Fig. 8, Fig. 12-16]. The plurality of grooves formed in the inner surface, as shown in these figures, cause the inner surface to be rough. That is, if one rubbed one's finger over the surface of the inside surface (301) of the stent, it would feel rough—i.e. ^{coarse}~~coarse~~ and not *smooth*. The word *asperity* is defined as "roughness or harshness, as of a surface."

Palmaz does not specifically disclose the roughness factor of the inside surface of his stent being between approximately 40 nm and approximately 210 nm, but it can be inferred that his roughness factor [as defined by the Applicant] is greater than 40 nm, as explained below. Applicant, in the Specification discloses that 40 nm is the "upper limit of roughness factors typical of *polished stent surfaces*" [page 9, lines 28-29]. In other words, correctly polished stents for medical uses will have roughness factors less than 40 nm. Therefore, a stent with an *unpolished surface* or, *even more so*, a surface having *grooves* in it as Palmaz's does, must have a roughness factor, as

defined by the Applicant [Equation 1, page 10], of greater than 40 nm. Palmaz's stent has an inner surface with asperities, as discussed above, and will have a roughness factor greater than 40 nm. The grooves in Palmaz's stent are $.5-10 \times 10^{-6}$ meters deep and $2-40 \times 10^{-6}$ meters wide. Therefore, Palmaz's stent has significant grooves and because the difference between 40 nm and 100 nm is so minute, it is clear that the interior of Palmaz's stent will be rougher than a polished metal surface with a roughness of 40 nm.

Palmaz discloses the claimed invention except for a roughness factor in the specific range of 40-210 nm, as set forth by Applicant. However, it would have been obvious to one having ordinary skill in the art at the time of the invention to form as many indentations "so as to cover as much of the inner surface 301 of stent 300 as desired" [column 5, lines 41-43]—in this case a roughness factor in the range of 40-210 nm—since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. Applicant is directed to the MPEP section 2144.05, subsections I, II, and III.

2. Regarding Claims 2 and 11, Palmaz discloses indentations ("grooves") with pointed, rounded, and rectangular shapes [Column 5, lines 4-9; Figures 9, 10, and 11]. Palmaz discloses many different grooves [Fig. 8].
3. Regarding Claim 3, Palmaz discloses depositing material on the rough inside surface of the stent. In Column 6, lines 51-58, Palmaz describes putting a coating on the inner surface of the stent. The rough inner surface of the stent includes *both* the

indentations (“grooves” 400) and the intervening inner surfaces (301) [see Fig. 8].

The *whole surface* shown in Figure 8 is rough and jagged.

4. Regarding Claim 4, the inner surface of Palmaz’s device is rough because material has been selectively etched from the body portion [Column 5, lines 9-17].
5. Regarding Claims 5 and 12, the roughened area of the inner surface (301) of Palmaz’s stent (300) includes substantially the entire inner surface of the body portion. As shown in Figure 8, and explained in Column 5, lines 19-52, the grooves (400, 400’, 400”, 400’’) of Palmaz’s stent can cover as much of the interior surface of the stent as is desired [column 5, lines 41-43]. In addition to the grooves, the rectangularly shaped holes *interspersed throughout the body* of the stent will also contribute to the rough feel of the stent [see Fig. 8].
6. Regarding Claims 6 and 13, the stent of Palmaz has a middle portion of its inner surface that is smooth [see Attachment #1]. Note that the *exemplary* middle section is chosen to illustrate that there is a middle portion that is smooth in the inner surface Palmaz’s device. There are other smooth portions in the middle of the inner surface Palmaz’s stent, as well. Specifically regarding Claim 13, the first and second ends of Palmaz’s stent have *selected roughened regions* on the interior surface. Palmaz discloses that the designer of the stent may choose, *i.e. select*, how many/which kind of grooves to put on the interior surface of the stent [Column 6, lines 45-51].
7. Regarding Claims 7 and 60, the roughened portion Palmaz’s tubular stent has a “roughness factor” greater than 40 nm. The Applicant, in the Specification discloses that 40 nm is the “upper limit of roughness factors typical of *polished stent surfaces*”

[page 9, lines 28-29]. In other words, correctly polished stents for medical uses will have roughness factors less than 40 nm. Therefore, a stent with an *unpolished surface* or, *even more so*, a surface having *grooves* in it, must have a roughness factor, as defined by the Applicant [Equation 1, page 10], of greater than 40 nm. Palmaz's stent has an inner surface with asperities, as discussed above, and will have a roughness factor of much greater than 40 nm.

8. Regarding Claim 8, alternatively, the maker of the Palmaz stent could choose to have enough indentations to have the roughness factor be between 100 and 200 nm since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art, as fully described under number 1 above.
9. Regarding Claim 9, Palmaz discloses coating the inner surface of his stent with a non-thrombogenic material. His coating is a *layer* (218) of endothelial cells, which covers the inner surface of the stent [Fig. 7; Column 5, lines 56-62], separating the asperities on the inner surface of the stent from the flowing blood. Palmaz explains that he is intending to form a *layer of cells*, not just a few scattered cells coating the interior of the stent [Column 1, lines 54-58; Column 4, lines 32-36]. Endothelial cells are the cells that coat the inner surfaces of natural blood vessels and the heart. When these cells are removed, platelets form. Platelets are the kind of cells that are *thrombogenic*, i.e. cause clotting. Endothelial cells *prevent thrombosis*, i.e. non-thrombogenic, and allow the interior of the stent to remain open [Column 1, lines 35-65].

10. Regarding Claim 10, Palmaz's stent has a body portion (300). The roughened portion of the stent (300) includes the flat inner surface (301) of the stent with the intervening grooves (400). The depth of each groove is .5-10 microns, which is a depth less than the thickness of the body portion (300), as shown in cross-sectional Figures 9-25. For example, Figure 10 shows very clearly that the depth of the groove (400) is less than the thickness of the wall between the inner and outer surface. Therefore, the roughened portion includes a region (i.e. at each groove) where the wall is thinner than the selected thickness. Palmaz disclosing as many grooves (a "plurality") as the user desires [column 5, lines 41-43].
11. Regarding Claims 14 and 62, Palmaz discloses coating the inner surface of the stent [Column 6, lines 52-58]. *Please note the intended use, as set forth in the claims, carries no weight in the absence of any distinguishing structure. Clearly, the coating is capable of increasing friction of the inner surface of the stent. Applicant claims no structure that sets the claimed stent apart from the prior art stent.*
12. Regarding Claims 57 and 58, Palmaz discloses coating the inner surface of a balloon-expandable stent before deployment in the patient's vasculature [Column 6, lines 52-58]. Palmaz's coating is only applied to the inner surface, and is applied over an asperity. For example, the coating would be applied to surface 301 in Figure 12. There are many different asperities, in between the many different grooves. A coating inherently reduces the interaction between the asperities (301) and the blood in the lumen, by separating one from the other.

The prior art clearly discloses the flat portions being coated. Applicant gives no structure whatsoever to the coating, and so coatings such as dust, air, or any kind of other debris (which would certainly be on the surface of the stent) are certainly capable of slightly separating the body from blood flowing through the stent. In this context, Applicant gives no criticality to the coating and very flimsy definition of what this coating entails. Applicant is invited to give more structural detail to further define the coating.

13. Regarding Claim 64, the inner surface of Palmaz's device is rougher than the outer surface, because the inner surface has many grooves, whereas the outer surface has none. Although the rectangularly shaped holes interspersed throughout the body of the stent will increase the roughness of the outer surface, they will equally increase the roughness of the inner surface. *The inner surface has grooves in addition to the holes*, and will consequently be rougher.

Allowable Subject Matter

14. Claim 62 is allowed.

Conclusion

15. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period,

then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Response to Arguments

16. Applicant's arguments, see REMARKS, filed January 31, 2005, with respect to the rejection(s) of claim(s) under 35 USC § 102 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of U.S. Patent No. 6,190,404 B1 to Palmaz et al (obviousness). *It is suggested that Applicant telephone Examiner before filing a response to this Final Rejection, to try and verbally come to an agreement.*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bradford C Pantuck whose telephone number is (571) 272-4701. The examiner can normally be reached on M-F 9:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anh Tuan Nguyen can be reached on (571) 272-4963. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 3731

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

BCP
BCP
March 17, 2005


ANH TUAN T. NGUYEN
SUPERVISORY PATENT EXAMINER
3/18/05